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Department of Transportation
Federal Aviation Administration
Office of the Chief Counsel
Attn.: Rules Docket (AGC-2000)
Docket No. FAA-1998-4815, Room 915G
800 Independence Avenue, S.W.
Washington, D.C. 20591

To Whom It May Concern;

Subject: Comments to Docket No. FAA- 1998-48 15

The Notice of Proposed Rulemaking (NPRM) 98-19, Bird Ingestion, published in the Federal Register, Docket No. FAA-1998-4815, was reviewed by The Boeing Company and resulted in the enclosed comments.

The Boeing Company is pleased to be a part of the rulemaking process and hope this cooperative effort will continue into the future. If there are any questions, please feel free to contact this office at any time.

Sincerely,

James E Vasatka

for B. A. Kupcis
Chief Engineer,
Regulatory Requirements
Phone: (425) 237-4304

Enclosure:

While The Boeing Company believes that the FAA's proposal will enhance flight safety related to multiple engine power loss from encounters with large flocking-birds, we continue to have reservations as to the completeness of the proposal. The Boeing Company also holds similar reservations concerning the Joint Aviation Authorities proposal.

Although it is believed that FAA and JAA actions will enhance flight safety, they are incomplete and/or not fully responsive to the overall flight safety gain sought by The Boeing Company. Rationale is as follows:

Both the current and proposed FAA regulations have an inherent dependence on future engines providing similar or better response to bird ingestion (ability to continue producing thrust sufficient for continued safe flight and landing) as current engines. There is an assumption that two single tests adequately confirm this similarity.

The multiple medium bird ingestion test (i.e. 4 birds at 2.5 pounds each for large engines) requires the continued production of 75% thrust or more. The single large bird ingestion test (i.e. 8 pounds for large engines) requires only safe shutdown. These two tests may not assure sufficient thrust for safe flight after an ingestion in two engines of single birds greater than 2.5 but less than 8 pounds. Based on historical data, the multiple engine ingestion rate for birds greater than 2.5 pounds is about 2 E-7 per aircraft flight. The data also indicates that many large bird ingestion events did not result in engine shutdown and the engine continues to produce sufficient thrust for continued safe flight and landing.

The critical safety issue is, given a multiple engine and large bird ingestion event on an airplane, what is the probability of having sufficient thrust for continued safe flight and landing? The assumption that the historical engine "capability" will continue to be produced by substantially different engine designs may not be validated by the FAA's proposal. The tenet, that overall safety will be improved, requires validation of this critical issue. Indeed, if it is assumed that the general design of engines always remains the same, the desired hazard rate on the order of 1E -8 may already have been achieved by the "marked decrease" in bird ingestion rates stated on page 3 of the NPRM. (Due to the informational campaign - Bird ingestion hazards and airport controls)

It is acknowledged that the original FAR 33 requirements did uot provide such a tacit assurance; however, historical engine designs have consistently produced useful thrust following some, but not all, large bird ingestion events. Industry should not assume the same bird ingestion capabilities will be present given new materials and/or unique engine design features.

It is suggested that additional engine validation is needed to ensure the capability of future engines to bird ingestion events is consistent with the historical record. A test utilizing a bird weight greater than 2.5 but less than 8 pounds may be appropriate.

The JAA's proposed rule addresses essentially the same issue but uses a demonstration criteria related to the loss of material from a fan blade. The Boeing Company does not believe that the JAA proposed criteria based on fractional loss of blade material is the most appropriate measure for compliance. However, the JAA position that two test points may not be sufficient to demonstrate that the safety objectives have been achieved for new and/or novel engine designs is supported.

The Industry's objective was to increase overall safety from a large flocking-bird threat. **Accepting the NPRM as written will provide the desired improvement in continued safe flight and landing** for aircraft using engines based on historical designs and is a significant step forward. It is recommended that both the FAA and JAA re-task the harmonization working **group activity to develop an appropriate rule, ensuring the historical single engine capability** to produce useful thrust after large bird strikes is maintained (or improved) for all future engine designs.